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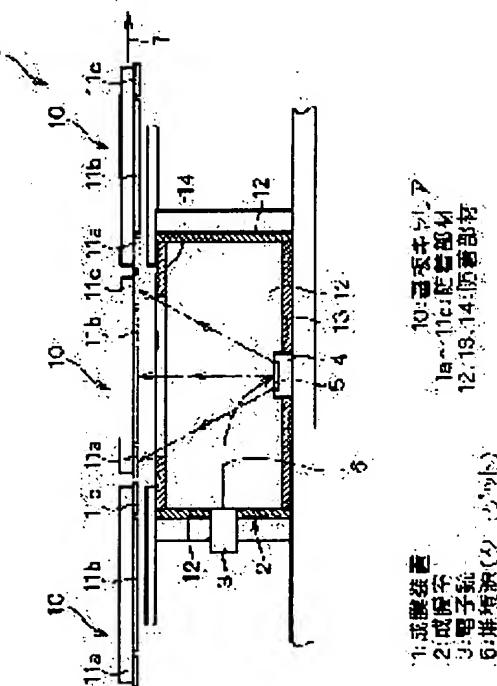
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(54) FILM DEPOSITION SYSTEM, AND DEPOSITION SHIELD MEMBER USED FOR FILM DEPOSITION SYSTEM

(57) Abstract:

PROBLEM TO BE SOLVED: To provide a film deposition system having deposition shield members capable of preventing the deposition of film onto the surface of substrate carriers and enabling easy maintenance at low cost.

SOLUTION: The film deposition system 1 has substrate carriers 10 for holding and transferring substrates, and film deposition is carried out by depositing vapor deposition particles onto the substrates mounted on the substrate carriers 10. Detachable deposition shield members 11a to 11c for preventing the deposition of film onto the surface of the substrate carriers 10 are attached to respective bottom faces of the substrate carriers 10.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the adhesive protection part material which prevents adhesion of the film in membrane formation equipment.

[0002]

[Description of the Prior Art] Membrane formation equipment is equipment which can form a thin film on a substrate at a membrane formation room by for example, the plasma-CVD method or the method of forming membranes under reduced pressure like a sputter. Since the film accumulates not only on a substrate but on the internal surface of a membrane formation room with this kind of membrane formation equipment, it is the object which makes maintenance services, such as that clearance, easy, and it is common that the removable protection fixture called an adhesion-proof board to that internal surface is attached. Thereby, at a membrane formation process, since the film accumulates on an adhesion-proof board and film formation on a membrane formation indoor wall surface is prevented, in the maintenance service of membrane formation equipment, the costs and time amount which wash a membrane formation indoor wall surface are substantially reduced by exchanging an adhesion-proof board.

[0003] As membrane formation equipment using this kind of adhesion-proof board, there is "vacuum membrane formation equipment" given in JP,11-6049,A. This vacuum membrane formation equipment steam-izes a vacuum evaporationo ingredient within a vacuum housing, is vacuum membrane formation equipment which makes a processed material body surface form the steam-ized vacuum evaporationo ingredient, and is characterized by having arranged the metal adhesion-proof board inside the side attachment wall of said vacuum housing, and having arranged the metal mesh plate removable inside this adhesion-proof board. Since the deposit resulting from said vacuum evaporationo ingredient adheres to a mesh plate firmly by this, the danger of the deposit adhering to an adhesion-proof board exfoliating, and falling, or floating the membrane formation interior of a room decreases.

[0004] Moreover, the outline block diagram of the conventional membrane formation equipment by electron-beam-heating vacuum deposition is illustrated to drawing 8. With this membrane formation equipment 60, an electron gun 62 is arranged to the flank of the membrane formation room 61, and the flank adhesion-proof boards 63, 63, and 63 are arranged so that the flank wall surface except the exit hole of this electron gun 62 may be covered. Moreover, the target 65 dedicated to Haas (hearth) of a crucible 64 is arranged at the pars basilaris ossis occipitalis of the membrane formation room 61, and the pars-basilaris-ossis-occipitalis adhesion-proof board 66 is arranged in it so that the pars-basilaris-ossis-occipitalis wall surface of the membrane formation room 61 except the neighborhood of this target 65 may be covered. Furthermore, the ceiling part adhesion-proof board 67 which had opening 67a which lets the vacuum evaporationo particle which flew from the target 65 pass formed is arranged in the head-lining section of the membrane formation room 61. The substrate carriers 70, 70, and 70 which carried the substrate above this ceiling part adhesion-proof board 67 are arranged along the conveyance way (not shown).

[0005] Changing the interior of said membrane formation room 61 into a high vacuum condition, the electron beam 68 injected from the electron gun 62 collides with a target 65 in response to the effect of an external magnetic field etc., heats this target 65, and makes a vacuum evaporationo particle emit. A vacuum evaporationo particle adheres to the base of the substrate carried in the substrate carrier 70 concerned through opening 67a of the ceiling part adhesion-proof board 67, and forms the film.

[0006] The conventional example of said substrate carrier 70 is shown in drawing 9, and it explains to it.

Drawing 9 (a) is the bottom view of the substrate carrier 70, and this drawing (b) is a D-D sectional view of this drawing (a). The substrate carrier 70 is equipped with the main frame 71 of the shape of a square which constitutes that periphery section, and the intermediate frame 72 which carries out the section of the field surrounded by this main frame 71 to two fields, it arranges masks 74 and 74 on installation and each mask attachment components 73 and 73, and each field by which the section is carried out constitutes the mask attachment components 73 and 73 from said main frame 71 and intermediate frame 72. A substrate (not shown) is laid on each masks 74 and 74, and through opening 74a of a mask 74, the above-mentioned vacuum evaporationo particle adheres to the base of a substrate, and forms the film. The substrate carrier 70 concerned will be transported to the next processing room towards the direction of an arrow head, if membrane formation processing is received at the membrane formation room concerned. In addition, although this conventional example shows the substrate carrier of the horizontal type which changes a substrate into an abbreviation vertical condition and conveys it, the substrate carrier of the vertical mold which changes a substrate into an abbreviation vertical condition and conveys it also exists.

[0007] Moreover, drawing 10 (a) is the front view showing an example of said flank adhesion-proof board 63, and this drawing (b) is the side elevation. Moreover, drawing 11 (a) is the bottom view of said ceiling part adhesion-proof board 67, and this drawing (b) is an E-E sectional view of this drawing (a). Opening 67a of the bow configuration which lets the vacuum evaporationo particle which flew from the target 65 pass is formed in the ceiling part adhesion-proof board 67. This ceiling part adhesion-proof board 67 is arranged in membrane formation equipment 60 so that it may be in agreement with the longitudinal direction (the conveyance direction) of the substrate carrier which the vertical direction of drawing 11 (a) showed to drawing 9 . Although a vacuum evaporationo particle passes the opening 67a and the film is formed in a substrate front face, thickness distribution of the film in a substrate front face can be adjusted by changing the bow configuration of the opening 67a.

[0008]

[Problem(s) to be Solved by the Invention] Generally, membrane formation equipment also requires the cutback of the costs at the time of the maintenance which that the high level of production capacity and the stability of quality are required must carry out periodically from the first. As a result of this invention person's inquiring wholeheartedly about conventional membrane formation equipment about this point, the problem of the following (1) - (4) etc. was found out.

[0009] (1) The maintenance nature at the time of exchanging a substrate carrier with the weight of the substrate carrier itself has the problem of being very bad.

[0010] (2) Moreover, with the above-mentioned conventional membrane formation equipment, since a vacuum evaporationo particle adheres also to the front face of the substrate carrier 70 and the film is formed, it will be necessary to wash the substrate carrier itself periodically, and the cutback of the washing costs will serve as a big technical problem. Although the vacuum membrane formation equipment indicated in the above-mentioned official report could prevent adhesion of the film to a membrane formation indoor wall surface, there was what can reduce the washing costs of the substrate carrier 70. [no] In the case of the substrate carrier of a horizontal type especially described above, the danger of the film tending to adhere to the base, and the adhering deposit exfoliating, and falling, or floating the membrane formation interior of a room is high.

[0011] (3) Moreover, since membranous coating weight is the member which shows many the great portion of washing costs in the case of the flank adhesion-proof board 63 arranged in the side-attachment-wall side of the above-mentioned membrane formation room 61, and the ceiling part adhesion-proof board 67 arranged in the head-lining section of the membrane formation room 61, it is necessary to reduce the washing costs.

[0012] (4) And although the above-mentioned ceiling part adhesion-proof board 67 has the mask function to adjust thickness distribution of the film deposited on a substrate by the opening 67a, according to the configuration and loading number of sheets of the substrate to carry, it needs to prepare the ceiling part adhesion-proof board 67 with which the configurations of the opening 67a differ one by one, needs to exchange them, and has the problem that the exchange takes costs and time and effort.

[0013] The place which this invention tends to solve in view of the above problem etc. prevents adhesion of the film to a substrate carrier front face, and is in simple and the point of offering membrane formation equipment equipped with the adhesive protection part material which can be performed by low cost, about a maintenance.

[0014]

[Means for Solving the Problem] It is membrane-formation equipment which the membrane-formation equipment according to claim 1 applied to this invention that said technical problem should be solved is

equipped with the substrate carrier which holds and conveys a substrate, make a membrane-formation ingredient particle adhere to the substrate carried in the substrate carrier concerned, and forms the film, and it is characterized by to equip the front face concerned of said substrate carrier with the adhesive protection part material which can be detached and attached and which prevents adhesion of the film on said substrate carrier. [0015] Invention according to claim 2 is membrane formation equipment according to claim 1, it has the structure where said substrate carrier holds a substrate in the abbreviation level condition, and said membrane formation ingredient particle is given from the lower part of said substrate carrier.

[0016] Invention according to claim 3 is membrane formation equipment according to claim 1 or 2, and two or more kinds are prepared, and said adhesive protection part material can exchange it on the front face concerned of said substrate carrier, and can equip with it.

[0017] Invention according to claim 4 is membrane formation equipment given in any 1 term of claims 1-3, and it is constituted so that said adhesive protection part material may reverse the 1st and 2nd principal planes to said substrate carrier and wearing of it may be attained.

[0018] Invention according to claim 5 is further equipped with the adhesive protection part material which has opening which lets the membrane formation ingredient particle which was membrane formation equipment given in any 1 term of claims 1-4, was arranged between said substrate carrier and the source of a membrane formation ingredient, and was emitted from said source of a membrane formation ingredient pass, and comes to have the opening adjustable device in which said adhesive protection part material changes the configuration of said opening.

[0019] The sheet-like member which invention according to claim 6 is membrane formation equipment given in any 1 term of claims 1-5, and can exfoliate on the front face to which the membrane formation ingredient particle of said adhesive protection part material adheres is stuck.

[0020] Invention according to claim 7 is membrane formation equipment according to claim 6, and two or more sheets of said sheet-like member are stuck on the front face concerned in the state of a laminating.

[0021] Moreover, the adhesive protection part material according to claim 8 concerning this invention is adhesive protection part material used for the membrane-formation equipment which a membrane-formation ingredient particle is made to adhere to a substrate, and forms the film, and said adhesive protection part material is characterized by to have the opening adjustable device in which the configuration of said opening is changed while it has opening which lets the membrane-formation ingredient particle which was arranged between said substrate and the source of a membrane-formation ingredient, and was emitted from said source of a membrane-formation ingredient pass.

[0022] It comes to stick the sheet-like member which invention according to claim 9 is adhesive protection part material according to claim 8, and can exfoliate on the front face to which a membrane formation ingredient particle adheres.

[0023] Adhesive protection part material according to claim 10 is adhesive protection part material according to claim 9, and two or more sheets of said sheet-like member are stuck on the front face concerned in the state of a laminating.

[0024] Moreover, the adhesive protection part material according to claim 11 concerning this invention is adhesive protection part material used for the membrane formation equipment which a membrane formation ingredient particle is made to adhere to a substrate, and forms the film, and is characterized by sticking the sheet-like member which can exfoliate on the front face to which a membrane formation ingredient particle adheres.

[0025] Invention according to claim 12 is adhesive protection part material according to claim 11, and two or more sheets of said sheet-like member are stuck on the front face concerned in the state of a laminating.

[0026]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to a drawing.

[0027] Drawing 1 is a schematic diagram for explaining the membrane formation equipment 1 concerning the gestalt of this operation. By this membrane formation equipment's 1 arranging an electron gun 3 in the flank of the membrane formation room 2, and arranging the source 5 of deposition (target) which is a source of a membrane formation ingredient dedicated to the pars basilaris ossis occipitalis of the membrane formation room 2 at Haas in a crucible 4 (hearth), under high vacuum conditions The electron beam 6 injected from said electron gun 3 according to an operation of an external magnetic field etc. is made to collide with the source 5 of deposition, this source 5 of deposition is heated, a vacuum evaporationo particle is generated, and the electron-beam-heating vacuum deposition which an upper substrate front face is made to carry out the adhesion

deposition of the vacuum evaporationo particle, and forms a thin film is adopted.

[0028] Moreover, the substrate which has the film formed is carried in the substrate carriers 10, 10, and 10 and -- equipped with the adhesive protection part material 11a, 11b, and 11c, and said vacuum evaporationo particle adheres to the base of the substrate carried in the substrate carrier 10 concerned, and forms the film. The substrate carrier 10 concerned which finished membrane formation processing is transported to the next membrane formation room (not shown) etc. in the direction of an arrow head 7 according to a conveyance device (not shown). Since two or more membrane formation rooms are transported continuously, without putting especially the substrate carrier 10 to the open air etc. in the case of in-line type membrane formation equipment, compared with the case of the substrate carrier of a vertical mold, the coating weight of the film to the substrate carrier 10 increases, and the above-mentioned cutback of washing costs serves as a much more big technical problem.

[0029] Moreover, the flank adhesive protection part material 12, 12, and 12 is arranged so that the side-attachment-wall side of the above-mentioned membrane formation room 2 may be covered, and the pars-basilaris-ossis-occipitalis adhesive protection part material 13 is arranged so that the pars-basilaris-ossis-occipitalis wall surface of the membrane formation room 2 except near said source 5 of deposition may be covered. Furthermore, the ceiling part adhesive protection part material 14 which had opening 14a which a vacuum evaporationo particle passes formed is arranged in the head-lining section of the membrane formation room 2, and it is prevented that a vacuum evaporationo particle adheres to the internal surface of the membrane formation room 2 by these adhesive protection part material 12, 13, and 14.

[0030] in addition, PVD (physical-vapor-deposition-hysical Vapor Deposition) of not only electron-beam-heating vacuum deposition but known [this invention] -- law and CVD (chemical vacuum deposition; Chemical Vapor Deposition) -- it is applicable to law. The source of deposition (target) is dedicated to the heater produced with the refractory metal etc. for example, under high vacuum conditions The resistance heating vacuum deposition which a current is passed [vacuum deposition] at this heater, carries out heating evaporation of the source of deposition, and makes a vacuum evaporationo particle fly, The sputtering method to which irradiate the particle of high energy in the solid source of deposition (target), and a vacuum evaporationo particle is made to emit from this source of deposition, Under high vacuum conditions, a part of vacuum evaporationo particle is ionized, it accelerates, and the ion plating method which irradiates a vacuum evaporationo particle and its ion and forms a thin film on a substrate is mentioned.

[0031] Drawing 2 (a) is the bottom view showing an example of the above-mentioned substrate carrier 10, and this drawing (b) is an A-A sectional view of drawing 2 (a). This substrate carrier 10 is equipped with the main frame 15 of the shape of a square which constitutes the periphery section of the substrate carrier 10 concerned, and the intermediate frame 16 which can be detached and attached and which uses a screw etc. for this main frame 15, is fixed to it, and divides a contrant region to two fields like the conventional substrate carrier 70 shown by drawing 7 . As for said main frame 15 and intermediate frame 16, it is desirable to consist of construction material which cannot deteriorate easily due to adhesion of a vacuum evaporationo particle.

[0032] The mask attachment components 17 and 17 which have opening 17a are fixed to each of the field divided by such a main frame 15 and an intermediate frame 16, and the masks 18 and 18 equipped with opening 18a on these masks attachment components 17 and 17 are arranged. And a substrate (not shown) is laid on these masks 18 and 18.

[0033] Moreover, two or more tabular adhesive protection part material 11a-11h is being fixed to the base to which the vacuum evaporationo particle of said main frame 15 adheres using the bolt etc. in the wrap form in the base concerned. Here, between the adhesive protection part material 11a-11h, path clearance 19a-19h is set up so that installation or removal of the adhesive protection part material 11a-11h to the base concerned may become easy. Moreover, in the base concerned, the adhesive protection part material 11i and 11j tabular in a wrap form uses a bolt etc. also for the base to which the vacuum evaporationo particle of said intermediate frame 16 adheres, and is fixed to it. Between said adhesive protection part material 11i and 11j, path clearance 19i is set up from the above-mentioned reason. In order [which the film adhering to the base material of said adhesive protection part material 11a-11j exfoliates here, and falls inside the membrane formation room 2] to protect a thing, it is desirable to perform blasting processing.

[0034] Furthermore, in order to prevent a vacuum evaporationo particle adhering to the surroundings lump substrate carrier 10 in the gaps 20a-20d of said adhesive protection part material 11a-11j and mask attachment components 17 and 17 so that it may illustrate to drawing 2 (b) although not clearly shown with the gestalt of this operation, A part of adhesive protection part material may be transformed, or the adhesive protection part

material of further others may be attached in said gap so that these clearances 20a-20d may be filled.

[0035] By such configuration, the vacuum evaporationo particle which flies from the base side of the substrate carrier 10 The base of the substrate carrier 10 will be adhered to the front face of the wrap adhesive protection part material 11a-11j through the openings 18a and 18a of masks 18 and 18. In the case of the maintenance of membrane formation equipment In order for what is necessary to be to remove said adhesive protection part material 11a-11j from a main frame 15 or an intermediate frame 16, and just to exchange, it becomes possible to reduce substantially the costs which washing processing of the substrate carrier 10 takes, and time and effort. Moreover, since two or more kinds of things which have the configuration which suits the wearing part to the substrate carrier 10 as said adhesive protection part material 11a-11j are prepared, corresponding to the configuration and number of sheets of a loading substrate, the adhesive protection part material which suits if needed is chosen suitably, the adhesive protection part material concerned can be attached in the substrate carrier 10, or can be exchanged, and it becomes possible to demonstrate the membranous adhesion-proof effectiveness certainly.

[0036] Moreover, with the gestalt of this operation, said adhesive protection part material 11a-11j can be turned over, and it can also fix to a main frame 15 or an intermediate frame 16. For example, a location is changed for the adhesive protection part material 11a and 11c to inside-out and mutual, it can fix to a main frame 15, or a location can be changed to inside-out and mutual and the adhesive protection part material 11i and 11j can be fixed to an intermediate frame 16. Thus, since the adhesive protection part material 11a-11j has a wearing side over a main frame 15 or an intermediate frame 16 to both sides of the 1st principal plane and 2nd principal plane, it carries out front flesh-side reversal of the 1st and 2nd principal planes, can equip frames 15 and 16 with them, ensures [quickly and] exchange of the adhesive protection part material at the time of a maintenance, and becomes possible [reducing further the costs which it takes, and time and effort].

[0037] Moreover, since it is fixed to the main frame 15 free [attachment and detachment], said intermediate frame 16 can remove this. The example of the substrate carrier 30 which removed said intermediate frame 16 is shown in drawing 3 . Drawing 3 (a) is the bottom view of the substrate carrier 30, and this drawing (b) is a B-B sectional view of drawing 3 (a). In drawing 3 , the explanation is omitted as what has this configuration about the member which attached the same sign as drawing 2 . The substrate carrier 30 of this example carries one substrate, and fixes the mask attachment component 31 which has opening 31a for it inside a main frame 15, the mask 32 equipped with opening 32a on this mask attachment component 31 is arranged, and a substrate is laid on this mask 32.

[0038] Although the configuration of the adhesive protection part material 11a-11j attached in a main frame 15 or an intermediate frame 16 was tabular in the example shown above, which configuration is sufficient as long as it is the configuration which ***'s in this invention in the shape of [of not only this but a substrate carrier] surface type.

[0039] Next, the side-attachment-wall side of the membrane formation room 2 shown in drawing 1 is explained about the example of the wrap flank adhesive protection part material 12. Drawing 4 (a) is the front view of the flank adhesive protection part material 12, and this drawing (b) is the side elevation. As mentioned above, there is much coating weight of the film to the flank adhesive protection part material 12, and as shown in drawing 4 , after the sheet-like member 40 whose thickness is dozens of micrometers has carried out two or more sheet laminating, it is stuck on the field where the vacuum evaporationo particle of the flank adhesive protection part material 12 adheres in order to reduce the washing costs of the flank adhesive protection part material 12. It is desirable to use the construction material which cannot deteriorate easily due to adhesion of a vacuum evaporationo particle, for example, aluminum, as a sheet-like member 40, and such a sheet-like member 40 is stuck on the flank adhesive protection part material 12 by using a double-sided tape, or forming a bending piece in an edge, and diverting the bolt which used the flank adhesive protection part material 12 for fixing to the membrane formation room 2. [engaging with the flank adhesive protection part material 12]

[0040] Since what is necessary is to exfoliate at the time of the maintenance of membrane formation equipment 1, and just to exchange at it the sheet-like member stuck on the flank adhesive protection part material 12 by such configuration, it is a short time very much, and a maintenance can be performed with the sufficient effect. Moreover, by using the sheet-like members 40a and 40b of two or more sheets, adhesion of the vacuum evaporationo particle to the flank adhesive protection part material 12 can be prevented more certainly, it exfoliates and only sheet-like member 40a of the outermost part shown in drawing 4 (b) can be exchanged.

[0041] Next, the example of the ceiling part adhesive protection part material 14 arranged in the head-lining section of the membrane formation room 2 shown in drawing 1 is explained. Drawing 5 (a) is the bottom view of

the ceiling part adhesive protection part material 14, and this drawing (b) is a C-C sectional view of drawing 5 (a). This ceiling part adhesive protection part material 14 is arranged so that the vertical direction of drawing 5 may be in agreement with the longitudinal direction (the conveyance direction) of the substrate carriers 10 and 30 of drawing 2 or drawing 3.

[0042] There is much coating weight of the film to the ceiling part adhesive protection part material 14 like the above-mentioned flank adhesive protection part material 12, and in order to reduce the washing costs, as shown in drawing 5, two or more sheet-like members 41a and 41b with the same construction material and the thickness as the sheet-like member 40 used by the above-mentioned flank adhesive protection part material 12 carry out a laminating to the base to which the vacuum evaporationo particle of the ceiling part adhesive protection part material 14 adheres, and are stuck on it. Therefore, for the same reason as the case of the above-mentioned flank adhesive protection part material 12, at the time of the maintenance of membrane formation equipment 1, adhesion of the film to the ceiling part adhesive protection part material 14 can be prevented more certainly, it exfoliates and only outermost sheet-like member 41a can be exchanged.

[0043] As mentioned above, being reduced 40% or more is checked compared with the case where blasting processing is performed to said adhesive protection part material 12 and 14, without using a sheet-like member for the washing costs at the time of using a sheet-like member to the flank adhesive protection part material 12 and the ceiling part adhesive protection part material 14, and it turns out in that said adhesive protection part material reduces the maintenance costs of membrane formation equipment that it is a very effective means.

[0044] Moreover, opening 14a of the ceiling part adhesive protection part material 14 achieves the function which restricts the through put of a vacuum evaporationo particle and controls membranous thickness as it mentioned above, and it can control thickness distribution of the film deposited on a substrate by adjusting the configuration of the opening 14a.

[0045] For example, thickness can be increased by expanding the configuration of the opening 14a in the direction of a right angle to the longitudinal direction (the conveyance direction) of the longitudinal direction of a drawing, i.e., drawing 2, and the substrate carrier shown in 3. Drawing 6 is the schematic diagram showing the example of the ceiling part adhesive protection part material which has the adjustable structure of changing this kind of opening configuration, this drawing (a) is that front view, and this drawing (b) is that rear view. This ceiling part adhesive protection part material 50 consists of the tabular body section 51 which has opening 51a of a segment configuration, and tabular controller material 52A and 52B with which it was equipped free [a slide] to this body section 51. Since the controller material 52A and 52B can be slid to the virtual locations 53A and 53B shown with the alternate long and short dash line from the illustrated continuous-line location, it can change an open area of opening 51a of the segment configuration prepared in the body section 51 free, and becomes possible [adjusting the amount of negotiations of a vacuum evaporationo particle, and controlling thickness].

[0046] Moreover, the deposition range of the film which deposits the configuration of opening 14a of the above-mentioned ceiling part adhesive protection part material 14 on a substrate by reducing to the vertical direction of a drawing, i.e., drawing 2, and the longitudinal direction (the conveyance direction) of the substrate carrier which showed 3 can be narrowed. Drawing 7 is the outline front view showing the example of the ceiling part adhesive protection part material which has the adjustable structure of changing this kind of opening configuration. This ceiling part adhesive protection part material 55 consists of the body section 56 which has opening 56a, and controller material 57A and 57B with which this body section 56 was equipped free [a slide], and can slide said controller material 57A and 57B to the virtual locations 58A and 58B shown with the alternate long and short dash line from the illustrated continuous-line location. It becomes possible to change an open area of opening 56a free, and to control the deposition range of the film on the substrate concerned by these controller material 57A and 57B by opening, or it closes the both ends of opening 56a of the body section 56. When making one substrate deposit the film using the substrate carrier which followed, for example, was shown in drawing 3, the advantage that the deposition range of membranous is restricted and film formation can be performed efficiently is acquired by making open area of opening 56a small.

[0047] In addition, the opening adjustable device which enables thickness adjustment of drawing 6, and the opening adjustable device whose adjustment of the deposition range of the film of drawing 7 is enabled may be combined. The adjustable device may be controlled manually, and even if controlled by the known automatic-control means, it is not cared about.

[0048] As mentioned above, the costs and time and effort which prepare the ceiling part adhesive protection part material from which an opening configuration differs one by one, and exchange it according to the adjustable device of opening of ceiling part adhesive protection part material shown in drawing 6 and drawing 7 so that it

may **** in the configuration and loading number of sheets of the substrate carried in a substrate carrier are reducible.

[0049]

[Effect of the Invention] According to the membrane formation equipment of this invention according to claim 1, adhesion of the film on a substrate carrier is prevented by adhesive protection part material like the above, and in case it is a maintenance, it becomes possible to reduce substantially the costs which the maintenance of membrane formation equipment takes, and time and effort that what is necessary is to remove the adhesive protection part material to which the film adhered from a substrate carrier, and just to exchange.

[0050] According to membrane formation equipment according to claim 2, the costs and time and effort which a maintenance takes also to the substrate carrier of the so-called horizontal type which makes the film adhere to the base of said substrate where a substrate is held horizontally are substantially reducible.

[0051] According to membrane formation equipment according to claim 3, corresponding to the configuration and number of sheets of the substrate carried in a substrate carrier, the stowed position of the adhesive protection part material to a substrate carrier can be changed flexibly, and the membranous adhesion-proof effectiveness can be demonstrated certainly.

[0052] According to membrane formation equipment according to claim 4, since a substrate carrier can be equipped with all of the 1st and 2nd principal planes of adhesive protection part material, exchange of the adhesive protection part material at the time of the maintenance of membrane formation equipment can be performed quickly and certainly, and it becomes possible to reduce further the costs which the maintenance takes simultaneously, and time and effort.

[0053] According to membrane formation equipment according to claim 5 and the adhesive protection part material according to claim 8, it becomes possible to reduce the costs which prepare the ceiling part adhesive protection part material from which an opening configuration differs one by one, and exchange it, and time and effort according to the configuration and loading number of sheets of a substrate.

[0054] In order for what is necessary to be according to membrane formation equipment according to claim 6 and claim 9, and the adhesive protection part material of 11 publications to exfoliate at the time of a maintenance and just to exchange at it the sheet-like member stuck on adhesive protection part material, it is a short time very much, and a maintenance can be performed efficiently, and it becomes possible to reduce washing costs substantially.

[0055] According to membrane formation equipment according to claim 7 and claim 10, and the adhesive protection part material of 12 publications, since it exfoliates sequentially from an outside sheet-like member among the sheet-like members in a laminating condition and can exchange, it becomes possible to reduce further the costs which a maintenance takes, and time and effort.

[Translation done.]